VOL. XI. No. 14. JULY 2, 1914

THE JOURNAL OF PHILOSOPHY
PSYCHOLOGY AND SCIENTIFIC METHODS

A DEFINITION OF CAUSATION. IV

WE have in the preceding paper passed in review all the kinds of causal process found under the heading "Properties of Matter"; the second principal group of cases marked out at the beginning of our investigation. Before going to the third group, that of electrical phenomena, it may be well very briefly to summarize the results so far.

From the point of view of one who looks for new light on the nature of causation the results of the second group were decidedly disappointing. Under the first group, Mechanics, we found two types clearly emerging: a certain serial type called a self-repeater, and one of composition. Under the "Properties of Matter" we obtained some cases which were believed to reduce to the mechanical types, but more which gave no result at all. Perhaps the science of the near future will either reduce these to mechanical or electrical cases, or prove them *sui generis*. But at present the scientific analysis gives no further data. This is, of course, one of the imperfections inherent in empirical method; yet there seems no dodging it, if we wish to remain in touch with what is assuredly known of the existent world.

Meanwhile an objection arises, accusing us of a certain arbitrariness. It may be asked, why do we not accept elasticity, density, etc., as ultimate causes, connected with their effects, motion, acceleration, etc., and needing no further analysis? We were willing, under Dynamics and Statics, to accept motion, mass, position, etc., as ultimate causes, leading to motion, etc., as effects. We did not then accuse science of having not analyzed sufficiently. Does it not, therefore, seem that we are biased in favor of a mechanical type, and so long as causes have not been reduced to such a type, arbitrarily consider them not yet analyzed? Certainly such a bias has no just place in an empirical investigation. This objection, however, misunderstands the situation. There is a definite ignorance with regard to elasticity, density, friction, such as is not the case in motion causing motion. With the dynamical phenomena, both cause and

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effect are distinguishable and verifiable by sense-observation. With elasticity, only the effect, the recovery of normal size and shape, is identifiable. There is no verifiable preceding or accompanying phenomenon in the body which can be distinguished from this recovery and assigned as its cause. It is believed that there is such a phenomenon, and that it is of the nature of a system of intramolecular stresses; but these stresses are not definitely described. Elasticity, then, is at present a name for an effect to which science has not yet correlated a cause. The only requirement for our investigation is that we are provided with a definite, identifiable cause, and a definite, identifiable effect distinguished from that cause. *Then* we can undertake, by analysis, to bring to light the relations that hold between them; and upon the application of this method to all known types of causation, to base a general definition of the causal relation. But this we can not do until *both* the cause and the effect are furnished. It is not that the mechanical has any inherent advantage over any other causal explanation; in the field of electricity, indeed, we shall find a different type, which is quite as clear and good. And what has been said of elasticity holds as well, *mutatis mutandis,* of resistance, density, crystallization, etc.

We pass now to the third group of causal events. The recent advances in this field are summed up in what is known as the electron-theory. Our task is then to expound the fundamental laws of that theory, which are believed to account for electrical phenomena so far as they are at present explained.

III. Causation in the Field of Electricity

The electron-theory explains a great many of the phenomena of light, heat, electricity, magnetism, chemistry, which, so far, mechanical theories have been unable to explain. It does not supersede or account for the laws of mechanics, but rather invokes them in its applications. The causal sequences that obtain among electrons are not then to be regarded as more fundamental than those of mechanics. "The corpuscular [electron] theory of matter with its assumptions of electrical charges and the forces between them is not nearly so fundamental as the vortex-atom theory of matter, in which all that is postulated is an incompressible frictionless fluid possessing inertia and capable of transmitting pressure."[1] We have here simply a type of events as yet unreduced to any other type. It is not however based simply upon hypothesis. "We have direct experimental proof of the existence of these corpuscles."[2] Yet, while certain of the laws governing electrons are established, there is, it appears, by

[1] J. J. Thomson, "Corpuscular Theory of Matter," page 2.

[2] *Op. cit.*, page 2.

no means a fixed body of doctrine throughout this region. The best we can do is to state some of the typical views, indicating where they are hypothetical rather than generally accepted. The type of causation in each view will serve to illustrate scientific procedure in this field, so far as that can be done at present. We begin with the more generally accepted properties of electrons.

1. Each electron at rest repels every other electron at rest. "The fundamental property of the electron which distinguishes it from ordinary matter is that it repels another electron, instead of attracting it, as two pieces of matter would do."[3] "Every electron placed at a distance of 1 cm. from another electron repels it with a force of 1.16×10^{-19} dynes" (p. 29). Each electron has thus a definite and constant negative charge, whose action consists in just this force of repulsion; and the electric current consists in the motion of such electrons. When, however, they move at a very high velocity, the mass increases, "just as if the ether in that space were set in motion by the passage through it of the lines of force proceeding from the charged body, and . . . the increase in the mass of the charged body arose from the mass of the ether set in motion by the lines of electric force."[4] This apparent increase of mass does not hold of the electron itself; that remains constant. Furthermore, this repulsion decreases with the square of the distance,[5] which means (analogously to what we saw in the case of gravitation) that the repulsion from a given electron runs outward uniformly in a straight line.

The cause of this repulsion is not assigned. "We shall not attempt to go behind these forces and discuss the mechanism by which they might be produced."[6] The most that can at present be done is to see the way in which this repulsion acts. The above account makes it comparable with gravitation, or any pressure or tension acting uniformly in a straight line. Whether considered as holding between electrons at rest or as between them when moving, it clearly has the same logical structure as was found above in Statics and Dynamics, in the serial type.

2. The same laws hold between the positive atoms at rest, *i. e.*, those which have been deprived, each of the same number of electrons.

3. "Every electron attracts every neutral atom from which one electron is removed, when placed at a distance of 1 cm. from it, with the same force—*viz.*, 1.16×10^{-19} dynes, or if two, three, etc., electrons have been removed, with a force two, three, etc., times that amount."[7] This attraction varies also inversely as the square of the

[3] E. Fournier d'Albe, "The Electron Theory," page 23.
[4] "Corpuscular Theory," page 29.
[5] *Ibid.*, page 1.
[6] "Corpuscular Theory," page 1.
[7] *El. Th.*, page 29.

distance. When this attraction is combined with the original motion of the electron, the resultant is an orbital motion of the electron. "These electrons are usually associated with atoms of ordinary matter, round which they describe circular or elliptical orbits, with periods approaching those of visible light-waves."[8] (This statement, however, seems to embody no more than a hypothesis). Such orbits are conceived analogous to those of our solar system; they are resultants of attraction and some original motion, and as such are believed to obey the laws of Kepler and Newton.[9] The cause of this attraction is not assigned, but the way in which it behaves is, once more, that of a force acting uniformly in a straight line, as in the case of the repulsions between like charges.

4. ". . . electrons moving side by side through the ether attract each other with a force proportional to their speed, and inversely proportional to the square of their distance apart."[10]

We now come to a distinctly hypothetical part of the theory. The attraction between electrons in motion, it is supposed, "balances their electrostatic repulsion as soon as they travel with the velocity of light" (p. 147). Also, "when an electron and a positive atom travel side by side through the ether, their original attraction is balanced by mutual repulsion, so that, again, when they travel with the velocity of light, they exert no mutual force" (*ibid.*). As the forces described in 1, 2, and 3, above were electrostatic forces holding between electrons at rest, so these are electrodynamic, between electrons in motion. They are claimed to be the fundamental events, in terms of which magnetism, radiant energy, etc., are described. According to the view here set forth, it follows that the way in which one electron influences another moving beside it is to retard its motion; if that other is stationary, to impart to it a motion in the opposite direction.[11] "A change of momentum of an electron produces a change of momentum in every other electron in the opposite direction" (p. 281). This mode of behavior is alleged to be exemplified in the electromagnetic wave, which is constituted by the swinging of one electron giving rise to that of another, and so on; each one swinging in a plane perpendicular to the direction of the propagation, and the propagation taking place with the velocity of light. As these waves produce radiant heat or light according to their length, it seems fair to say that the typical causal events (on this view) in the whole field of radiant energy and electricity are

[8] *Op. cit.*, page 280.

[9] *Cf.* the calculations, *op. cit.*, page 32, made on that assumption.

[10] *Op. cit.*, pages 280–281.

[11] *Op. cit.*, pages 176–79.

believed to be the motion of an electron and the imparting of motion from one electron to another.

The analogy between these types of causation and the mechanical ones is striking. "It is as if the electric momentum—the momentum of electric charges—destroyed in one body reappeared in another, just as in a collision there is a transfer of momentum" (pp. 237–238). Each electron imparts a momentum equal to its own, in a reversed and parallel direction, to the next; this imparts in the same way to the next, and so on. It is not, apparently, done by contact. Nevertheless the electron's influence is conceived as permeating all the adjacent continuous space, just as gravitation does; for it acts upon other electrons at any given distance from itself. It is supposed to be continuously active as we go out from it in space. We are reminded of the case of the bar balanced on a fulcrum, where the downward pressure is communicated from one end to the other. The causal process in the present case seems to lend itself to just such a serial description as in that one.

Much of this is tentative (if I understand the matter correctly). The law of inverse squares is, however, I believe, generally admitted, and the uniform action which that implies may be reduced, as in the case of gravitation, to the same serial type as uniform motion. We are concerned only to show that the kind of explanation that is offered in the hypothetical portion of the doctrine is of the same general logical structure.

A quite different mode of conceiving the fundamental electron-event is that of F. Bohr.[12] This dispenses with the notion of an ether-wave entirely, replacing it by that of the projection of a uniformly rotating electron; the rotation accounting for the periodicity of light. This is clearly a dynamical type,—though its source is, I believe, not explained as yet. On the whole, then, it seems safe to say that there are at present no causal explanations offered in this field which can not be reduced to a type analogous to that found in mechanics.

Before proceeding to analyze the results obtained for the cause-effect-situation, in general, we must notice an already mentioned definition, apparently grounded on an exhaustive empirical survey, by Professor Ostwald. According to him, whenever we have causation, we have an uncompensated difference between two adjacent intensive or potential quantities of the same kind. Now this is indeed empirically grounded, but—in accord with the standpoint of energetics—it neglects analysis. The "*Stärken*" or potential factors are not analyzed, nor is the way in which the effect follows, or even the effect itself, subjected to scrutiny. The definition, though not as

[12] *Philos. Mag.*, July, 1913.

abstract as those of Russell or Natorp, remains less than concrete. Had Professor Ostwald attempted to perform analysis, he would, I venture to think, have found that this formula is largely tautological. For intensive quantities, as he uses them, are those factors of energy which contain a time-factor in their definition. The capacity-factors—mass, specific heat, etc.,—do not change; the *"Stärken"*—velocity, temperature, etc.,—do change. If there is change then, *i. e.*, an event, it must occur in the intensive factors; they are defined as those which alone can change, in a given system. Why it is that there must be a difference between the two is equally obvious. For otherwise there would be no opportunity for change. If all bodies moved with the same velocity relatively to one another, there would be no relative motion, and no mechanical events. If all bodies, and empty space as well, were at the same temperature, there would be no heat-events. In fact, we have already found that an uncompensated potential factor *meant* loss of equilibrium—whence is obvious the tautological character.

Nevertheless there is a sense in which Ostwald's formula is not tautological. It is a generalization from the second law of thermodynamics, which is by no means a tautology. That law has a positive meaning which Ostwald's formula has in its generalized form lost. It tells us that the event which happens is in *one certain direction* rather than its opposite. Heat in available form decreases rather than increases. The tendency is always toward lower rather than higher levels. Professor Bergson regards this as so fundamental a trait of all material processes as to warrant us in defining the very nature of matter thereby. Whether that may turn out true or not, it is a universal empirical character for which, so far as I know, no explanation has been given by science. As to the mode in which it acts, it is believed to be that of a uniform process; whether it takes the form of pressure, motion, radiation, or electric potential. The reason why this empirical property holds, then, not being yet assigned, we have here no data for analysis; but the mode in which the change from higher to lower levels occurs has already been examined in the fields of mechanics and electricity.

The final task is to define more precisely the invariant structure which we have found in all the cases which yielded results. Two types were discovered: that of composition, and that of a series which was called a self-repeater. Are these distinct, or reducible to one type? Let us first briefly recall them, and then proceed to analysis.

The invariant *composition* was found in Statics and Dynamics, and afterward seen to be universally present, since every phenomenon is a complex one. Its nature was extremely simple: two forces,

motions, accelerations, pressures, combine to produce a third in which they are preserved intact. That is all we need now recall of that type. The invariant *series* was found, in Statics, in the principle of transmissibility and in the moment of a force about an axis; in Dynamics, in uniform motion, rest, collision of bodies; in the law of inverse squares holding for so many phenomena outside Mechanics, as gravitation, attraction, and repulsion of electrons, and in fact throughout the field of electron-theory. Its structure was temporarily defined as determined by a first term x, which was followed or accompanied by a second term x', essentially similar to x in all respects save one or more definitely named differences (position, magnitude). It was suggested, but not proved, that this would suffice to generate an endless number of following cases, x'', x''', etc. We have now to study these two invariants more closely.

Each starts from a duality. By this is meant that in each the cause is *two terms* with a certain relation between them. This is self-evident in the case of composition, where the two factors plus the relation of *combination* determine unambiguously the resultant. In the case of the series, as was already suggested, two terms with a relation of sameness—and also of difference—between them determine unambiguously the remainder. Let us now see by some further analysis that this is really the case. The terms are conceived different in ordinal position—if that phrase may properly be used of less than three. If not, we must find some other phrase such as temporal position or spatial direction. The first is more fundamental than the second *only* in the sense that the second is defined by reference to the first, but not conversely. It is not meant that the first gives rise to, or necessitates, or in any way accounts for, the second. *E. g.*, the first term x of the series is a body in a certain spatial position at a certain time; the second term is a body in another spatial position at another time. The latter body is defined as *the same as* the first (*whatever* that may mean), and its spatial and temporal positions are defined as *later than or beyond* those of the first. Of course this definition is theoretically reversible, and we might define the first by means of the second; this would indeed be *a priori* possible, but would not be an adequate account of the particular types we have been studying. Here is where our procedure once more definitely diverges from the method of *a priori* logic, which finds asymmetry reducible to symmetry.[13] The reason why we must diverge from this interpretation is that we are dealing with existences. In the existential world, things do not conform to this

[13] J. Royce, following C. L. Franklin and A. B. Kempe, in *Trans. Am. Math. Soc.*, Vol. 6, pages 353–415, and in *this* problem, B. Russell, *Proc. Arist. Soc.*, 1912–13, pages 10–11, 15, 21.

ideal symmetrical arrangement; the relation of earlier to later is existentially irreversible. We accept this irreversibility as fact, recognizing that the relations between these two members are not symmetrically describable except by abstraction from this irreversibility. Science regards the first as existing without the other, but not conversely; x exists before x', when x' does not as yet exist; but it is not true that x' exists when x has no existence; for the past has a certain title to existence which the future has not. This is a fundamental attribute of time, which *a priori* methods generally neglect. Stated in terms of time, then, our point is that the past has a certain existential rank higher than that of the future. Accordingly the second member of the series must be defined by reference to the first but not conversely; otherwise our definition of the series would be abstract and would neglect this empirical character of precedence. But the first member does not, of course, suffice to define any series; it does not determine that there *is* a second term which is defined in terms of it. It *needs* the second term in order to constitute the series, as truly as that term needs it. And in all this we claim to be stating the structure of the empirical process. It is that character of the inquiry alone which precludes the symmetry and consequently renders ultimate the difference between the two terms.

The first two members give rise to the series in the following manner: x is followed by x' where x' is defined by its sameness with x, and also has a certain additional difference whereby it is made a distinct case whose existence is independent of x. We now concentrate our attention on the sameness, for it is this relation that will bear the burden of what follows. It is a given fact that the relation "followed by x'" is associated with x; or as science and ordinary thought put it, x has the particular property of being followed by x'. Now this simply means that this property is predicated of x, or is in the last analysis in part to be identified with x, as a thing is identified with its properties.[14] That is, it has the relation of sameness with x. So we have, in addition to the above relation, x' is the same as x, this further relation, x is the same as this particular property of being followed by x'. We have, then, two relations, which may be symbolized thus: $x'Rx$, and xSy, when y is this property in question. The inference is inevitable and uniquely determined, $x'RSy$; x' has the relation to y which is the "relative product" of the relations R and S. Now in this case R and S are both the relation "the same

[14] The externality of relations would seem to forbid this, but the matter may be stated consistently with that view. x has the relation "followed by x'" and x' is the same with, or defined by x, hence x' has the relation "followed by itself."

as," which happens to be a transitive relation. Hence the result must read, $x'Ry$; the "relative product" is equivalent to the original relation. Translating this, we have: x' has the property of being followed by itself, *i. e.,* it implies another case of itself.

If x' implies *another case* of itself, this latter will be defined just as x' was defined, consistently of course with its distinctness from x'. Its relation to x' will be seen to be exactly analogous to the relation of x' to x. It is, in fact, the third member of the series, which we called x''. Being exactly analogous to x', it in turn will be subject to the same reasoning, and will imply one more case of itself, which is the fourth member of the series, x'''. It is clear that the series must continue indefinitely.

Thus, it is claimed, the first two terms, related as we found them to be, determine the rest of the series. Inasmuch as more seems to come out of the premises than was put into them, we may profitably make some comments before going further, and meet some obvious objections.

Notice, first, that every term and relation here found is strictly particular—or individual if that is a less universalized term. x and x' clearly are so. The "property of being followed by" sounds general, but is not here used as general; we dealt only with this particular case of it. We *found* by inspection of the situation that it must *become* so; but that is not determined either by the statement "x' is the same as x," or by the statement, "x is the same as the property." Nor is it tacitly presupposing a universal when we call x'' "another case" cf x'; for two cases only are meant, and it is not yet known that there could be more. Two cases of course do not constitute a universal—nor do any finite number of cases.

Notice, second, that the result is in no way tacitly taken for granted at the outset. When we say x' is the same as x, it is a very natural criticism to reply that we really mean "x' is the same as x in respect to the property of being followed by x'." If this were true, we should have already begged the result; we should not have defined the series by the two terms and their relation alone, but by two terms so defined as directly to include an endless series of terms. But it is not true. To define x' to be the same as x is not, *so far,* to define it as the same as this property of x. For x can and does exist without this property: in the case of a body at rest it is not followed by the x' which follows it in the case of motion. The being followed by x' is not a necessary consequence of x; we saw this above, when we showed that x' is not dependent for its existence upon x. But even if the property of being followed *were* a necessary consequence of the existence of x, we should not have tacitly assumed it; for in general it does not follow, if $x'Rx$ and xSy, that $x'Ry$—as we saw

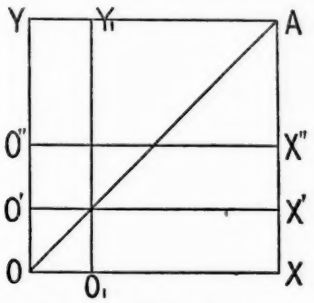
just now. It *does* follow in the case of a transitive relation such as sameness; and the fact is so familiar that we know instantly it *will* follow and so we seem to have assumed it at the beginning. Indeed, if this criticism were not very probable, we could have phrased the whole matter much more simply thus: x is followed by x' which resembles x and therefore must be followed by a particular case resembling itself, x''.

A second natural criticism is an accusation of self-contradiction. If this, and the answer to it, are pushed very far, we shall land in a dialectic. This I believe to be no sound objection to the criticism; but it has been expressly barred from this investigation. We desire only to show that the above description of the series uses nothing which is contradictory to the ordinary scientific usage. That two terms can be the same while different does not seem contradictory to common reflection; for we speak, and the scientist speaks, of the *same* (and not merely an equal) mass in different positions, the *same* (and not merely an equal) momentum in different bodies, etc. That a term can be "followed by itself" does sound paradoxical; but when the phrase: "by another case of itself" is substituted, it does not sound paradoxical at all. For that is a property we ascribe to any universal. One case of it is (in part) just like another and may follow or precede it. We claim, then, merely that our definition is no more contradictory than the practise and speech of science. If that is philosophically condemned, let it be so; but if not, neither should our view be condemned. It may be remembered that *one* reason for considering science as not ultimate has already seemed to disappear, *viz.*, a generalization we made from the principle of composition. But of course others remain.

Two related factors, then, seem necessary and sufficient to every cause of the serial type, and these two determine what follows, *i. e.*, the effect. One alone would, it appears, never produce anything. It would be a potentiality only. A mere potentiality would never produce an actual event: the series would not start but for the second member being added to the first. Thus all causes of the serial type may be considered as *Auslösungen:* a potentiality *plus* a motion or change. The case of spark and gunpowder is not at all unique. But this is only one side of the matter. The two main types, the series and the composition, are alike in more than the duality of the causal member.

The principle of composition may be stated in serial form. Every force acts in a certain line, and is defined by the acceleration it imparts along that line, represented by a certain length. The resultant line is uniquely determined by the component lines, in length and direction. How happens this determination? Let us take

a simple case. Imagine the components to be OX and OY, the resultant OA. How then is the certainty secured, that OA and



nothing else is the resultant? This situation may be put in serial form in many ways, one of which is as follows. The length OX from O takes us just as far in a fixed direction from OY as the length $O'X'$. The length $O'X'$ takes us just as far in the same direction from OY as the length $O''X''$. And so on; the length YA being one of the members of this series. The series is quite analogous to the self-repeater above. We do the same thing for the lengths OY, O_1Y_1, etc., and thus arrive at XA. Now it is being a member of such a series that determines A to be the required terminus of the resultant. Not OA, but some other line OB would be the resultant, if the series were not a valid one, truly describing the nature of space. The point A is determined to be where it is by virtue of being in both of these series at once. Thus viewed, the composition of forces is not a mysterious union of two entities to produce by some magic a third, but the meeting-point of two repeating series.

The necessary and sufficient condition of the series was found to be two terms in a certain relation. That is, given that much, the rest *of necessity and by pure deduction* follows. Hence the series contains *necessary connection.* Had Hume examined specific cases of causation, or had he even told us what necessary connection meant, the present almost universal philosophical skepticism in regard to its existence might not have come into being. One great obstacle, too, to his search, was that he treated a cause as *one* instead of *two.* At any rate, the denial of real necessity has usually been made without a fair examination of the evidence. If the evidence here offered is sound, and the analysis of it correct, we seem to have obtained an answer to Hume of a very different character from the usual one: an answer which finds necessity in the empirical contents of experience, rather than in the form imposed on it by mind. We have examined those contents by themselves, as science alleges that they occur in the material world. No hypothesis of the presence of mind as law-maker was needed to account for necessary connection between cause and effect, nor any assertion of the independent "subsistence" of

universals. In fact we have, if no mistake has been made, been able to derive the concept of the universal, *i. e.*, that which may have *any* number of instances, from a system of two particular terms and a particular relation. Of course this result has not yet been subjected to criticism, such as the different schools of philosophy might make. One suggestion may perhaps without impropriety be offered. If the method here pursued gives us a result (the objective existence of necessary connection) which philosophers have been in the past unable to reach, and in default of which they were driven to various modern "schools" to account for the persistent human error of believing in it—if it gives us this, does there not seem to be less reason to fear criticism? For if we are correct, we have something, the lack of which has occasioned a number of modern philosophic systems. And if such a view *could* survive their criticism the practical belief of every one that events are necessitated by their causes is justified. Nature, in fact, on our view, deduces itself from its past—so far as there is causation.

The meaning of causation which applies to the external world appears then to be: two facts or events such that one precedes the other, temporally or logically, and the second is defined by the first, *i. e.*, the same as the first; a second case of it with added differences. This constitutes the cause. The definition would repay further analysis, I think, but let this now suffice. The effect is the logical deduction from this, the necessary consequence; a never finished series. In practise we generally single out the member, or members, of this series, that for the purpose in hand interests us, and consider it or them the cause with reference to what follows, or the effect with reference to what precedes. We may now see why the momentum of a body *must* be conserved, why the law of inertia *must* hold; in short, why anything that is caused *must* be what it is. That does not, of course, enable us to say that causation is everywhere present. There may very well be indeterminate beginnings; that there are, I have elsewhere tried to show. If there are, then the universe would seem to be a growing one: for since no causal series is ever finished, new beginnings would simply add to the content of the universe, and the series started by them—if any—would never be destroyed. But aside from this interesting speculation, the main results of this investigation are, that there is necessity in the existent world, and that it is not an absolute *a priori* necessity, but one *derived from* the existence of a dyadic relation. No necessity, probably, could be derived from *one term alone,* where Hume and his successors always looked for it, but only from two. Whether or not this result is valid for ultimate reality, is another question.

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EXTERNALITY AND INHIBITION[1]

THAT the object known is not affected or altered by the act of knowing it, seems to be one of the cardinal doctrines of the neo-realistic position; and conversely that the existence of an idea in consciousness does not necessarily imply a corresponding objective reality, nor a subsistential, much less a substantial, form of existence on the part of the idea itself. "'A cat may look at a king,' but that makes no difference to the king who is looked at," a neo-realist remarks, "though it may be a significant moment to the cat who looks. And if the cat instead of looking at a real king dreams of a king that is unreal, why here again the only difference is to the cat. When Puss abandons these royal pageants and goes on her way, she does not . . . take with her either the veridical or the hallucinatory king. She takes with her not the object remembered, but only the memory of the object. And while these kingly memories may be precious and profitable to her, they are without the slightest consequence for their majesties."[2]

To take another illustration from the realm of animal psychology. The pike, or the perch, is taught to inhibit its normal instinct to prey upon minnows by means of a transparent glass plate placed between it and the smaller fry. After many a vain dash against the invisible barrier, it surrenders its usual type of response to the stimulus afforded by the propinquity of the minnows, and on the removal of the glass plate it can be trusted to molest them no longer. If the pike still continues to regard the minnows from time to time, and there is some evidence that it does, it may be said to have fairly started on the way toward a realistic position. It is beginning to know minnows. Before, in the naturalistic state of existence, the minnow was, we may suppose, merely a darting gleam and a satisfied appetite. But now it is not inconceivable that the sadder but wiser pike is dimly conscious of "their silver bellies on the pebbly sand," rather than of its own.

The doctrine that the act of knowing does not affect or alter the object is limited, so I understand, to the knowledge process. It does not apply to non-cognitive relations between organism and environment. Thus, one organism may act on another organism or on an object in such a way as to produce a profound alteration in its appearance, character, or behavior. So far, I have found nothing in the neo-realistic doctrine that rules out as illusory the alterations in things produced by this, that, or the other agency. You may build up or you may destroy, you may be worn by time or you may be rejuvenated

[1] Read at a meeting of the Western Philosophical Association, April 9, 1914.

[2] W. P. Montague, "Unreal Subsistence and Consciousness," *The Philosophical Review*, Vol. XXIII. (Jan., 1914), page 51.

by life in the open, as freely under realistic auspices as under any other (although from the standpoint of realistic epistemology this freedom may be indistinguishable from negative and abstract freedom, like freedom to starve, or like the freedom of the infinite limbo circumjacent to the Euler circles). But be it remembered that when and as you come to *know* an object or a relation, you do not in and through knowing it affect or alter it. With a candle you may set fire to your house and be the means of changing it to a heap of ruins. But as a knower of that house your knowledge of it is, to borrow an illustration from a realistic writer, like the candle which illuminates the objects in a room without altering them. And the illustration of the illuminating candle would fail us if there chanced to be exposed to its rays a sensitive photographic plate.

To know is to refrain. To perceive is to let be. To understand is to stand aloof. *Noscere est inhibere.* In Thoreau's phrase, "A man is wise in proportion to the number of things he can afford to let alone."

The realistic psychology is sound, I submit, as far as it goes. Inhibition is an essential factor in knowledge.[3] Responses, instincts, habits, that ordinarily in their functioning produce changes in the objects furnishing the accustomed stimuli, are held up. Other responses are stimulated which leave the object, for the time being at least, unmolested. The direct response is inhibited and becomes the stimulus to an indirect response. We learn to observe, to reconnoiter. We learn to become objective, to suspend action, pending investigation of possibilities. We withdraw more and more from any attempt to influence the object in terms of personal control or manipulation. We come to desire rather the more indirect control which results from a deeper and more sympathetic understanding of the nature of the object itself. In his quarrel with the subjective idealist, the realist appears to have seized upon and generalized a significant phase of the cognitive process, that of inhibition, a phase essential to the transformation of action from direct alteration of objects, in food-getting, constructive, and other forms of manipulation, to more indirect and possibly more effective modes of alteration, and a phase which a subjective positivism naturally disregards. With justice the realist may be said to criticize an idealistic, humanistic, panpsychic, pragmatic, radically empiric interpretation, or any other interpretation of the cognitive process, if it seems to offer the easy way of immediacy, the short-cut of intuition, the direct response of manipulation, for the more self-denying, more patient, and more discrimi-

[3] I am indebted to Professor A. H. Lloyd's earlier teaching on the subject of inhibition, especially as regards the rôle of inhibition in perception.

nating envisagement of a stubborn world of objective conditions, yes, of external things and relations.

But the doctrine of the essential externality of cognitive relations suggests that the realist has remained behind in one stage of the cognitive process, that he resembles the pike, or the perch, in the experiment, in that he goes on believing that there is a barrier between himself and the world of things and relations after the barrier has been removed. (Or is it always an irremovable barrier?) His belief may be an artefact, the product of an artificial condition, the artificiality of which he does not suspect, even after the externality becomes as an existence purely illusory. Possibly a subjective idealist has in him the best material for a neo-realist. Naïve consciousness of complete adequacy, fondly cherished by an idealist, when broken against the impenetrable barrier of some brute fact may give rise to a sense of subjective limitation and of externality not easy to shake off.

What I would suggest by way of criticism of the realistic doctrine in question is that the inhibitory stage of development, to which the externality answers, may become an arrested stage of development, that it may be singled out and loaded until it becomes dominant, that it may be saturated until it tends to precipitate in fixed forms, that it may be fed until it becomes hypertropied.

It is not so much that realism may be charged with confusing the arrest of a stage of development with the facts regarding the normal function of the stage, as it is that realism may be interpreted (logically, if not historically) as reflecting conditions of the present time which tend to produce the arrest. It has become a matter of common experience that the multiplication of labor-saving devices, the application of science and invention to trade and industry, have made products increasingly accessible to many and processes increasingly remote. This applies not only to those products that are deemed the necessities of life, but also to the sciences and to the arts. Knowledge of the results of scientific inquiry and participation in the enjoyment of creations of art are increasingly available. The technique of both science and art has become correspondingly complex and difficult. Furthermore, the consumption of ready-made products and the excitations afforded by expertly elaborated forms of esthetic gratification may tend to arrest the development of productive capacity. The road forks. As the technique of production, industrial, scientific, or artistic, becomes increasingly difficult, and as the products become increasingly accessible, capacity for mastering technique is correspondingly undeveloped, and the individual as individual comes to count for less, except in a comparatively few cases of extraordinary

talent or opportunity. And even in these cases, the gap between the amateur and the expert becomes more and more noticeable.

In the development of a fairly complex form of skill, there is likely to be a point at which the old, relatively direct and immediate form of control is relinquished, and the new form of control of a more efficient type has not yet been worked out. The process of reconstruction does not always go on smoothly and without interruption. There is a halting stage. At this stage externality as a perception comes home to the learner with convincing force,—the alien quality of his instrument, as yet unmastered, of his medium, as yet refractory, of his technique, as yet insecure. The halting stage may stretch out in a long plateau, and there is the temptation to give over the pursuit of the skill and to appropriate instead the results of the more persistent or of the more fortunate. On this plateau is pitched the camp of the doctrine of external relations, a sort of half-way house. Normally this stage, having served a purpose, is transcended. Externalism gives way to a fuller and freer participation. But we are concerned here with the norm only as it may serve to throw the subnormal, the arrested development, into relief. A completely externalized world, a world between which and ourselves the screen had become more and more opaque until no hint of what was behind it ever passed through, would not be known, of course, even as external, except for reminiscence. The sense of externality arises out of a situation in which our commerce with some object is disturbed, prevented, inhibited, and yet in a measure persists. We are compelled to take a part for the whole.

It is important to have externality pointed out as a fact. One might go almost as far as to say that the sense of externality, the awareness of externality, the sense which realizes the resistance offered by things and relations to the ready responses of manipulation, or to the facile play of thought and feeling, is a sense of value akin to, if not derived from, the sense which holds certain things and relations sacred, inviolate, taboo. It is important to have externality pointed out as a fact, not only as a protection of hard-won values, but also as a criticism of the individual who confuses his experience of partial and facile participation in some of these hard-won values with the fuller and freer participation that comes only with discipline.

The individual has fared ill at the hands of the realist. His puny mental states have been rather mercilessly contrasted with the enduring realities of science, history, and nature. He is hardly more than "material" for the statistical button-molder to melt and flow into the external form of a probability curve. However unwarranted this sweeping disparagement of the individual may be, it may

well be heeded by the sort of individualism that, confusing the shadow with the substance, is blissfully unconscious of its externality to what it seems so intimately to possess. Partial participation in industrial processes through some narrowly specialized routine function, closely supervised, or through consumption of the mere skimmings of products; and similarly in the various forms of science, art, and institutional life,—this partial participation is prone to harbor the illusion of more or less complete participation. It is this illusion which the realistic doctrine may be interpreted as correcting by bringing it to consciousness, as if it were to say to this sort of individualism, "This property, which you claim to have produced; this art, which you seem to have expressed or appropriated; this science, which you, memorizing, have made so much your own that you are willing to believe that it was never anything but a part of your thought;—all these things are, in spite of the idealistic view of life that you may profess, external to yourself, and what you call these things are external to them. What you call wealth, whether you are a drudge or an idle annuitant, is an abstraction to the producer of values; what you call art, whether you are a philistine or an esthete, is alien to the cause of beauty which the artist serves; and the knowledge which you call science is the empirical information of the scientist. All of the real things referred to here are external to you. You have not participated in them. Your ideas about them, your illusions of them, 'are without the slightest consequence for their majesties.'" Accessibility of absorption and inaccessibility of productive participation have amounted to a barrier. "To my astonishment," said Thoreau, "I was informed, on leaving college, that I had studied navigation!—why, if I had taken one turn down the harbor I should have known more about it."

To sum up briefly:

1. The doctrine of the externality of relations, the doctrine that the objects of knowledge, things as well as relations, are not affected or altered by the act of knowing them, refers to the inhibitory aspect of the knowledge process.

2. A tendency to generalize this externality of relationships, however great the provocation to do so in the face of a subjective idealism, a tendency to regard that which exists for a phase of the knowledge process as existing independently, or absolutely, or as existing in any other sense than for a phase of reconstructive thought and action, marks an arrest of a stage of development.

3. Arrested development of this type is itself an existence or fact. The increasing accessibility of the products of industry, art, and science and the increasing inacessibility of productive participation in corresponding processes amount to an artificial and largely un-

suspected barrier between native capacities and their normal development. The most deadly sort of externalism is unconscious externalism, complacent, even idealistic externalism. The realistic doctrine of the externality of relations may be interpreted as a reflection of this very real sort of externalism; and as remedial in bringing it to consciousness and correcting its illusions.

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CONCEPTS AND EXISTENCE: A REPLY TO PROFESSOR PITKIN

WHEN I wrote down the reflections to which I had been stimulated by Professor Pitkin's article on "The Empirical Status of Geometrical Entities"[1] I knew that much that I said was obscure, and I am certainly to blame if Professor Pitkin believes that he differs from me when he states as his own opinion precisely the one that I sought to defend. There is, however, one point on which he may disagree with me, and of that presently; but even so, I doubt whether the difference is more than one of terminology or, at most, of emphasis. Meanwhile let me be as direct and as simple as I can.

A statement by the "New Realists," for which I have been very grateful, is the declaration in their book that logic (including, I suppose, mathematics) is a non-existential science. I asume that the geometrical entities under discussion are the lines, circles, ellipses, etc., that are the subject-matter of elementary geometry. But if logic (including mathematics) is a non-existential science, these geometrical entities must be a non-existential subject-matter. Now whatever an object of sense-perception may be, it is not non-existential. But if this is true, what we perceive when we see the straight edge of a building or the disk of the sun just above the horizon is not a geometrical entity. And I am not sure that Professor Pitkin holds that it is.

This is not, however, to deny, or in any way to compromise, the empirical status of geometrical concepts. It involves no insinuation that we know universals by a transcendental faculty of the intellect. But in order to escape from that superstition and establish the empirical status of universals, we are not obliged to forget that their nature is logical and not existential. And nothing that is perceived can, it seems to me, be that sort of thing.

Let us admit, however, that we do perceive genuine straight lines: We do not, as Professor Pitkin says, perceive them as definitions; we do not, *i. e.*, perceive them as logical entities. What, then, is the

[1] This JOURNAL, Vol. X., page 393.

relation between the logical entity and the empirical individual which, as Plato said, partakes of it? And when may we be said to "see" a genuine straight line? On this point, I have already said, in my previous discussion,[2] all that it occurs to me to say.

Professor Pitkin feels that I part company from him when I say that "the line is the definition"; I can not, he rightly holds, expect him to follow me in any assumption that results in identifying a cake with its recipe, or any material product with the formula for its manufacture. I certainly do not propose any such identification. It is not in the region of perceivable existences that the line is the definition, but in the region of *logical* entities, the region of if—then relations; and on page 132 I am accurately quoted: "In geometry, the line *is* the definition, although in architecture [*i. e.*, in buildings] it is a straight edge of structural matter."

Professor Pitkin's assertion that "The definition, in so far as it is a pragmatic entity, is related to the straight line precisely as the recipe of a cake is related to the cake," and his invitation to some pragmatists to be candid and say so, are well put. I do no object to this manner of statement. *In the cook book* the cake *is* the recipe. That is the only kind of cake that can possibly be there; it is an if—then cake. *In geometry* the line is the definition; it is an if—then entity. But the cake in the cook-book is not the cake on the table, nor is the line in geometry the straight edge of something in particular. The recipe for a cake is one way of answering the question, What is a cake? It is not the way that interests the hungry small boy, nor, perhaps, the family physician, but it is the kind of answer likely to be preferred by those who are interested in cake technically.

Whether Professor Pitkin and I are apart in anything more than terminology depends, I fancy, on whether he holds that the "perceived" straight line is a logical entity or an empirical individual that conforms to a set of specifications. I admit that my discussion of the matter is entirely dialectical, but the discussion is about dialectical entities and I do not see how a dialectical control is to be avoided. If I am wrong I think that what calls for elucidation is the statement that logic is not an existential science.

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REJOINDER TO PROFESSOR BUSH

I AM exceedingly grateful to Professor Bush for having put so clearly and decisively the fundamental issue our discussion leads back to. He brings before me an aspect of the whole matter

[2] "Concepts and Existence." This JOURNAL, Vol. X., page 686.

which, I must confess, has hitherto quite escaped me. I mean, of course, the bearing of my own views about perception upon the neo-realistic theory that logic is a non-existential science. Before passing to a consideration of the problem, I should like to call the reader's attention, partly in anticipatory self-defense and partly in innocent pride, to the fact that Professor Bush has convicted me clearly of *not* having deduced my theory of perception from a *credo* of the neo-realistic "school." Indeed, he has put me in the difficult position of having to reconcile two outwardly hostile opinions—or else of having to cast off the less empirical of the two. I do not hesitate to say that, *if* I had to choose between my opinion that we perceive geometrical entities and Russell's demonstration that logic is a non-existential science, I should reject the latter; and I should do so on the very crude ground that *I* can see straight lines, but I can not ever be absolutely sure about the presuppositions behind Mr. Russell's deductions. I say this, not in derogation of Mr. Russell, but only by way of confessing that my own reasoning powers are much weaker than my eyes.

Now, as for the difficulty Professor Bush raises. How can I reconcile the fact that I perceive a straight line with the neo-realistic opinion (which I have long held) that the objects of logic and geometry are non-existential? Are the two opinions contradictory? I think not. There are two ways of harmonizing them.

In the first place, we must say that the perceived straight line is only an element of a real complex. Its status is similar to that of the color of the sky against which the straight ridge pole of a house makes a straight line. It is, to use the language of Stumpf, a "dependent phase." Now, of such a phase, two propositions hold: (1) The straightness is logically independent of the other elements of the complex; *i. e.*, the character is not a function of any of them, as variables; and (2) the straightness has properties which are not elements of the complex; *i. e.*, the complex is just the percept, nothing more, nothing less, but the properties of rectilinearity are by no means all included in the percept.

Now the object of geometry, as I understand it, is (with respect to our chosen illustration) the conditions which "generate" and "follow from" rectilinearity. Obviously all these never have been and never will be given in a perceived line. But this is a very insufficient reason for denying that we perceive the genuine straightness of a line. You might as well say that we never perceive a tree because we only see the outside of a few of its leaves and part of its bark. In the strict metaphysical sense, we always perceive parts of real complexes and we never perceive more than parts of them. Our very sense organs, being selective receptors, make this inevitable.

I may now state my point in a mildly paradoxical form. Let me say that, in strictest metaphysical language, the geometer's line is *much more than straight;* and human eyes see only the straightness of it. As the physicist's light is more than the glow we see when we look into the sun, so are the objects of logic and geometry more. Failing to see the number of ether vibrations that constitute red light, we do not declare that we can not see real red light; we say we see only the redness of it. So ought we to reason, I believe, in the matter of the straight line.

Let me sum up my answer to Professor Bush's question about the relation between the logical entity and the empirical individual. Real complexes contain elements which do not *exist* apart from at least certain other elements, but which are independent *variables.* The conditions of their *subsistence* are found in other complexes which are, in many instances, subsistential only. Thus it happens that there may subsist an element which is a part of a real whole and also a part of a subsistent whole. It stands in two relational systems without prejudice to its identity. The natural sciences investigate the real complexes as such. Logic investigates certain subsistential complexes whose elements, although present in real complexes, are here considered in their other than existential relations.

In closing, let me venture the guess that some of the difficulty into which the critics of neo-realism have fallen is due to differences in the usage of the term "existence."

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REVIEWS AND ABSTRACTS OF LITERATURE

Pragmatism and Idealism. WILLIAM CALDWELL. London: Adam and Charles Black. 1913. Pp. vii + 268.

It seems inevitable that every philosopher who attempts to express his insight creatively in the form of a system should sully the purity of his product with the taint of his own personality. Enthusiasm over particular issues, limitations of experience, "points of view," these all tend towards an over-emphasis of one aspect at the expense—or even neglect—of others equally significant. And what is true here of the individual is true similarly, though perhaps to a less degree, of a school. It is a natural consequence, therefore, that success in expression stimulates a critical reaction and re-expression; which again in its turn runs the gauntlet of criticism, so far as it, too, has suffered from the unintended impress of individuality.

This appears to be the situation at present as to the schools of pragmatism and idealism; and Professor Caldwell as announcer of their claims, referee of their contest, and reconciler of their differences, has given us an

interesting summary of the situation. As announcer he presents their respective claims for favor, their history, and their supporters; as referee he scorches both sides with genial impartiality in the fire of his criticism of their unfair attacks and unjustified accusations; as reconciler he strives to show how each needs the other as a supplement and support; so that in the end, although the high-flying rationalistic idealism may have its wings clipped, yet it can be put on a firmer footing; and intuitive, instinctive pragmatism may be made stronger and sturdier by the addition of an intellectualistic background and basis.

A summary of the theories of pragmatism and a short account of the forms in which it has appeared here and abroad pave the way for a statement of its fundamental characteristics; chief among which Professor Caldwell finds these: its claims (1) that all truth is made truth; (2) that belief is a fundamental principle of human life, "faith must underlie all reason"; (3) that it gives a deeper view of human nature than rationalism; and (4) its anti-intellectualism. But the true heart of the pragmatic issue, he says, lies in "the fact of human action (activity in general) and of its significance for philosophy." To cut off practise from theory, acting from knowing, volition from intellect, has been a great mistake; and in emphasizing the activity aspects of human life pragmatism is rendering philosophy a tremendous service; for this is a real rediscovery of a rationalistically neglected and overlooked field. It is definitely to its credit that it does not start where idealism begins, with "contents of consciousness" as the one indubitable beginning, but rather with the "living reality of the world that we *know* and that we *experience.*" But it fails to be more than merely utilitarian for lack of an adequate justification of the truth it has grasped. Here it sadly needs the support of idealism—which affords "the only rational basis for its constructive interpretation of reality"; and of the "normative view of ethical science"—which reveals the ultra-utilitarian value of moral ideas. Thus it has failed as yet to realize to the full its great capabilities.

Two chapters near the end of the book are given to critiques of the philosophies of Bosanquet and Bergson, respectively. In finding much that is admirable in Bergson, "the greatest of all the pragmatists," and errors that are principally those of omission, and only occasionally those of inconsistency, the French philosopher comes out of the ordeal much better off than the Englishman; for Professor Caldwell, in selecting Bosanquet's Gifford Lectures as the typical expression of idealism, evidently found in them just what a pragmatist would be looking for—a "highly instructive" presentation of tendencies to be criticized. For to him these lectures are subject not only to "general perversity" and "a broad pervading inconsistency" in their theory of reality, but also to numerous other weaknesses, even to "essential non-moralism" and "apparently anti-ethical character." The only positive values that survive his examination are three: (1) Bosanquet's defense of philosophical attainment, as expressed in his "belief that in the main the work of philosophy has been done"; (2) his insistence upon the importance of grasping the principle of "meaning"; and (3) his unconscious testimony through his own dynamic idealism of

the importance of humanism. Such a contrast in critiques inclines one to question the perfect impartiality of the critic; and to wonder whether Dr. Bosanquet was chosen as a type or a target.

It is too much to expect that a book of 268 pages—of which 57 are devoted to the history of pragmatism, 27 to an elicitation of the American characteristics it reveals (interesting enough, but of questionable relevancy to the main theme), and an unusually goodly share of the remainder to foot-notes—should be able to compass in conclusive fashion the wide field which its task suggests. And as is invariably the case with referees and peacemakers, Professor Caldwell will doubtless find himself unpopular with both parties to the controversy, when they discover some of their pet doctrines rather summarily handled. But his analyses are elaborate in detail, if not always expanded sufficiently to be completely satisfying; and his book is thus stimulating and suggestive, even though it appears more as an outline of work to be amplified and completed than as the presentation of an issue that is settled. It is a sign-post; not a milestone.

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Essais de Critique Générale. CH. RENOUVIER. Paris: Librairie Armand Colin. 1912. *Premier Essai: Traité de Logique Générale et de Logique Formelle,* 2 vol., pp. xvii + 397 and 386. *Deuxième Essai: Traité de Psychologie Rationelle d'après les Principes du Criticisme,* 2 vol., pp. 398, 386. *Troisième Essai: Les Principes de la Nature,* pp. lxv + 444.

Renouvier's "Essais de Critique Générale," published between 1854 and 1897, comprise five works, the three essays enumerated above, a fourth essay, in one volume, entitled "Introduction à la Philosophie Analytique de l'Histoire, and a fifth essay, in four volumes, entitled "Philosophie Analytique de l'Histoire. Les Idées, les Religions, les Systèmes." The fourth essay is still available in a second edition and the fifth essay in the first edition, both published during the life of the author. The first three essays are now republished, owing to the fact that earlier editions are exhausted. The first essay originally bore the title "Analyse Générale de la Connaissance.—Plus un Appendice sur les Principes Généraux de la Logique et des Mathematiques," and appeared in 1854. The second edition, from which the present edition is reprinted, appeared in 1875, bearing a new title and containing numerous revisions, additions, and omissions. This essay contains the foundations of the author's "Néo-criticisme." Parts I. and II. are devoted to the development of a phenomenalistic interpretation of Kant, a Kantianism with the *Ding an sich* left out. In Part III. the categories, relation, number, position, succession, quality, becoming, causality, finality, and personality, are set forth as the laws of phenomena. In Part IV. the author defines the limits of scientific knowledge, and makes room for contingency and faith. The second essay appeared originally in 1859 under the title "L'Homme. La Raison, la Passion, la Liberté, la Certitude, la Probabilité Morale." The present edition is reprinted from the second edition of 1875. This essay culminates in the discussion of "The Probabilities concerning the Moral Order of the

World," in which the author sets forth his libertarian and pluralistic philosophy of religion. The third essay is reprinted from the second edition published in 1892. It contains discussions of atomism, mechanism, life, and evolution.

It would appear that Renouvier has few if any disciples, but that his influence has been widely diffused, and may be said to have been incorporated into the most characteristic contemporary philosophical tendencies. Renouvier's influence upon James is well known; and curiously enough it is through James that his influence is most strongly felt to-day in French thought. There are two principal motives in Renouvier's philosophy, his methodological empiricism and his religious faith. The reconciliation of these motives, or the determination of their relative priority constitutes the chief problem for students of his philosophy. Those who wish to pursue the question will do well to consult Robert le Savoureux's article entitled "L'Entreprise Philosophique de Renouvier."[1] This writer finds Renouvier's "*thèses morales*" to be the original and prior motive, as well as the more permanent contribution of his system. His recognition of the place of sentiment in belief, his justification of faith through assigning limits to positive knowledge, his development of the principle of probability in defense of belief in God, Freedom, and Immortality, his finitistic and pluralistic version of religion,—these will all be recognized as peculiarly characteristic of present-day religious thought. But others will value Renouvier more for his empiricism, for his more or less consistent use of the "critical" method, and will find him peculiarly prophetic of the present-day revival of "phenomenology" by Husserl, Meinong, and Russell, as well as of the neo-Kantianism of the Marburg school. Undoubtedly that which is most impressive to any casual reader is Renouvier's unusual blend of dialectical refinement, cleanness of analysis, love of clear ideas, with enthusiasm and sympathy for human hopes. In this general balance or wholeness of philosophical genius, as well as in sundry special matters of doctrine, the close similarity of Renouvier and James is most striking.

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Spencer's Philosophy of Science. C. LLOYD MORGAN. Oxford: The Clarendon Press. 1913. Pp. 53.

The main survey of "Spencer's Philosophy of Science" is to be found in the "First Principles." There is, however, a growing consensus of opinion that the early essay, "Progress: Its Law and Cause," contains the germ of "all that is best in the teaching of Herbert Spencer." It is here that such cardinal principles of evolution as progression from the simple to the complex, differentiation, and the multiplication of effects are developed. The correlative concept of integration, however, receives no emphasis in the early essay.

By philosophy of science is meant, according to Spencer, "completely unified knowledge." In accordance with this meaning one of the basal conceptions of the philosophy of science is "the universality of connection

[1] *Revue de Métaphysique et de Morale*, for September, 1912.

between cause and effect." In Spencer's treatment of this problem much confusion arises because he employs the term "cause" in a variety of meanings. It is used to stand for source, condition, energy, force, and power. Now it is one of the main tasks of a philosophy of science to avoid just such ambiguities. To this end, and in the interest of clarity and consistency, the terms source, ground, and condition are suggested and explained.

It is further urged as a matter of regret that Spencer did not devote "his great powers of thought to a searching discussion of the different types of relatedness which are found in nature and to a fuller consideration of a synthetic scheme of their interrelatedness." For example, there are three main types of relationship, the physico-chemical, the vital, and the cognitive. The problem is, How on an evolutionary basis are these various types related to each other, or more simply, how are the higher types in any one system related to the lower ones? This, though one of the main problems of a philosophy of science, is given but scant consideration by Spencer. The words differentiation and integration are quite inadequate. "But what one asks, and asks of him in vain, is just how, within a connected scheme, the several relational fields in the domain of nature are themselves related, and how they were themselves differentiated." It is Spencer's firm conviction that all types of relation can ultimately be reduced to the mechanical type, that is, the higher forms of relation can be explained by the lower forms. But Spencer failed to note that, in the physico-chemical system, for example, compounds contain "new and distinct properties" which are more than the algebraic sum of the elements. New relationships and new properties appear in the course of evolution, that is, "in all true evolution there is more in the conclusion than is given in the premises." Though this fact had been recognized by both Mill and G. H. Lewes, Spencer hardly recognizes it at all, and that but very tardily. He continues to think that biology and psychology can be reduced to mechanical terms.

There follows a brief analysis of Spencer's treatment of the cognitive relation, concluding that "an adequate analysis of cognitive relatedness on scientific lines is not to be found in Spencer's works." The problem of cognition is just beginning to receive scientific treatment, and it is contended that science must treat this problem on "precisely the same lines as it deals with any other natural kind of relatedness." Such hypotheses as a psychic entity, some *élan vital,* psycho-physical parallelism must be totally eliminated. Cognition develops from and implies the vital and physico-chemical just as the vital develops from and implies the physico-chemical.

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JOURNALS AND NEW BOOKS

ARCHIV FUR GESCHICHTE DER PHILOSOPHIE. October, 1913. *Neue Beiträge zur Entwicklungsgeschichte des Geist-Begriffs* (pp. 1–16): H. SIEBECK. – To a brief review of his earlier articles describing the development of the conception of spirit in the material and abstract directions, the author adds newly discovered passages from the Orphic, Pythagorean, Aristotelian, Stoic, medieval, and modern writings, showing that there has run through these teachings a twofold conception of spirit found clearly for the first time in Aristotle; the one conception emphasizes the spirit as a sort of material bond between body and soul, and the other regards it as immaterial, rational, divine, merely resident in man. *The Logic of Antisthenes* (pp. 17–38); C. M. GILLESPIE. – The concluding part of a detailed and scholarly examination of the logic and wider philosophical teachings of Antisthenes. The teaching of Cratylus is considered to represent the beliefs of Antisthenes, and his logic is compared with that of Hobbes. *Die Weltanschauung eines Romantikers* (pp. 39–44): AURELIA HOROVITZ. – In this mechanical age it is well to return to Fredrich Schlegel as a type of the romantic spirit which does not take the world as something given, as do the classic spirits, but regards it as the existentializing of its own inner longings. Schlegel in his later period felt he could not be satisfied with a God dependent on man's longings, and liked to think of the individual losing himself in the already existent limitless. Schlegel longs for some law of universal progress in history to the goal of oneness with the infinite, but does not find it. Schlegel's relation to Spinoza is treated. *Despinoza in neuer Beleuchtung* (pp. 45–71): J. HALPERN. – A critical and detailed review of a new work by Stanislaus von Dunin-Borkowski, S. J., which covers the literary background of Spinoza's thought, and the course of his development to the year 1657. The author endeavors to reconstruct the probable indebtedness of Spinoza. He finds him influenced as to subject-matter by the Jewish Scholastics, and as to form by Descartes and other contemporaries. He does not consider Spinoza's expulsion from the Synagogue of great moment in the personal life of the philosopher. He dates the composition of the "Short Treatise" between 1652–1658. The reviewer's criticism strikes mainly at the religious bias of the author. He predicts that the new book in spite of its faults will be for a long time a standard work. *Ein deutscher Pädagog als Vorgänger Spencers in der Klassifikation der Wissenschaften* (pp. 72–78): JOHANN WALDAPFEL. – Karl Mager in 1847 published a classification of the sciences in part like that which Spencer worked out about ten years later. The usual attempts are made to find a source common to the two men and to trace a connection between them. A remarkable lack of historical insight is manifest. *The Philosophy of Krause* (pp. 79–88): JAMES LINDSAY. – A sketch of the opinions of the German romanticist Krause. His technical vocabulary is deplored, and his teaching of "Panentheism" is explained and criticized, as is his philosophy of history. He was primarily a religious philosopher, and

identified Deity with the first principle of science. *Die Bedeutung des Gottesbegriffs bei Descartes* (pp. 89–118): WILHELM BAUER. – Descartes's method of giving a sure foundation to all knowledge is peculiar to himself rather than to his material. For this method the idea of God is of great importance. He must exist as the necessary determiner of the true and the good, and the guarantee of the constancy of law and order in the universe. *Rezensionen. Die neuesten Erscheinungen auf der Gebiet der Geschichte der Philosophie. Zeitschriftschau.*

REVUE DE METAPHYSIQUE ET DE MORALE. January, 1914. *Religion et Raison* (pp. 1–16): E. BOUTROUX. – "To-day, as in ancient Greece, *à propos* of the relation of religion and reason, . . . the highest and most practical way of putting the problem appears to be the one indicated by the celebrated line 'how to act that all shall be one, and each thing be a whole?'" *Un Inédit de Fichte* (pp. 17–26): J.-M. CARRÉ. – A manuscript found amongst the papers of Henry Crabbe Robinson and concerned with the Wissenshaftslehre. *Le Socialisme de Fichte d'après l'État Commercial Fermé* (pp. 27–71): X. LÉON. – An exposition of the work in question and a discussion of its detachment from the *à priori* standpoint of its author's general philosophy. *La Répartition des Richesses Comprise comme Simple Introduction à l'Économie Sociale* (pp. 72–82): B. LAVERGNE. – A critical study starting out from Jean-Baptiste Say's search for a rational division of political economy. *Études Critiques. Les Problèmes de la Logique, selon F. Enriques:* E. DE MICHELIS. *Testes Inédits de Leibniz Publiés par M. Ivan Jagodinsky:* A. RIVAUD. *Questions Pratiques. La Morale Sexuelle (fin):* TH. RUYSSEN. *Supplément.*

Hegenwald, Hermann. Immanuel Kant: Ausgewahlte Kleine Schriften. Leipzig: Verlag von Felix Meiner. 1914. Pp. lvi + 125. 1.40 M.
A new edition for school and private use. Contains an extensive introduction to Kant's philosophy and to philosophy in general. This book forms Volume I. of Meiners Volksausgaben.

Richter, Raoul. David Hume: Eine Untersuchung über den menschlichen Verstand. Leipzig: Verlag von Felix Meiner. Pp. viii + 283. 1.40 M.
This is Volume III. of Meiner's Volksausgaben,—a new translation into German of Hume's "Inquiry Concerning Human Understanding."

Thilly, Frank. A History of Philosophy. New York: Henry Holt and Company. 1914. Pp. xv + 612.

Varisco, Bernardino. The Great Problems. Tr. by R. C. Lodge. New York: The Macmillan Company. 1914. Pp. xi + 370. $2.75.

Whitney, George Tapley and Fogel, Philip Howard. An Introduction to Kant's Critical Philosophy. New York: The Macmillan Company. 1914. Pp. viii + 226. $1.00.

Windelband, W. Die Hypothese des Unbewussten. Heidelberg: Carl Winters Universitätsbuchhandlung. 1914. Pp. 22. .80 M.

NOTES AND NEWS

A CEREMONY in commemoration of the seven hundredth anniversary of the birth of Roger Bacon occurred at Oxford, on Wednesday, June 10. Proceedings began at noon with the unveiling, by Sir Archibald Geikie, of Mr. Hope-Pinker's statue of the great Franciscan, and its reception by Earl Curzon on behalf of the University. Addresses were presented by delegates, representing various bodies who had joined the movement, and the public orator, Mr. A. D. Godley, delivered a Latin oration. All this took place at the university museum. The delegates and some other visitors were entertained at lunch by the Warden and Fellows of Merton College, and other lunch parties were arranged. At three o'clock all visitors had the opportunity of attending the Romanes lecture. This was given in the Sheldonian Theater, the lecturer being Sir J. J. Thomson, of Cambridge, and his subject the atomic theory. From one to four o'clock various manuscripts and other objects of interest in connection with Roger Bacon and his successors were on view in the Bodleian Library, and from four to half-past six a garden party was held at Wadham College.

At the celebration the Vatican library was presented by Mgr. Ratti, the Institut de France by the Comte d'Haussonville, the University of Paris by Professor Picavet, the University of Cambridge by Professor James Ward, the Order of Friars Minor by Dr. P. Hickey, Provincial, and Professor Paschal Robinson, the Capuchian Order by Fr. Albert (vicar-provincial), and Fr. Cuthbert.

Subscribers of one guinea and upwards to the Roger Bacon commemoration fund were entitled to take part in the ceremonies at Oxford, and also to receive the memorial volume, which contains essays dealing with various aspects of Roger Bacon's work, written by specialists in the various subjects.

"THE *Zentralblatt für Psychologie und psychologische Pädagogik*, the first number of which has recently been received, is edited by Dr. Wilhelm Peters, University of Würzburg, and published by Curt Kabitzsch, Würzburg. It will contain no original investigations, but will confine itself strictly to abstracts and reviews. It aims to cover the whole field of psychology, both pure and applied, and will give especial attention to investigations in experimental education. There is undoubtedly a distinct need for a journal of this type. The periodicals in special fields of psychology are increasing so rapidly, and the books and monographs are pouring from the press in such quantities, that it is exceedingly difficult to keep abreast with all the literature. Most of the reviews in the journals conducted for that purpose are from one to three years behind the date of publication. The *Zentralblatt* will be issued 10 times a year, and proposes to give its readers a bird's-eye view of all the recent publications in any part of the psychological field. The first number contains 100 reviews, and the reader is impressed with their timeliness, their brevity and the thoroughness with which the field is covered. The subscription price is eight marks per year, which may be sent directly to the publisher, Curt Kabitzsch, Würzburg, Germany."—*Educational Review.*